

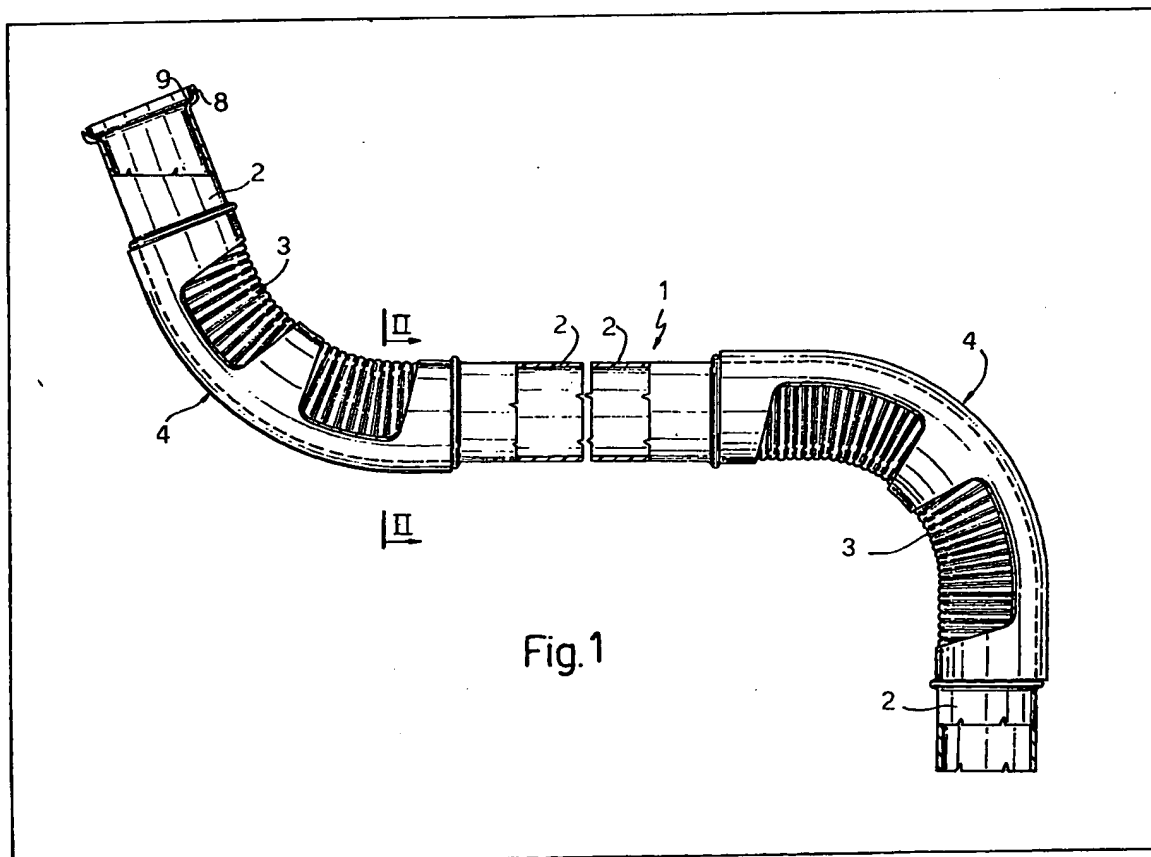
(12) UK Patent Application (19) GB (11) 2 088 515 A

(21) Application No 8135377
(22) Date of filing 24 Nov 1981
(30) Priority data
(31) 68816
(32) 28 Nov 1980
(33) Italy (IT)
(43) Application published
9 Jun 1982
(51) INT CL³
F16L 55/00 11/12
(52) Domestic classification
F2P 1A14 1B7
(56) Documents cited
GB 2054778A
GB 1594427
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GB 921255
GB 750973
GB 709381
GB 598363
(58) Field of search
F2P

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(54) Flexible pipe

(57) A pipe (1) comprises at least a portion (3) made of a relatively deformable material e.g. polythene, and means (4) which is mounted on the said portion to keep it bent. The means 4 may be a slotted sleeve.



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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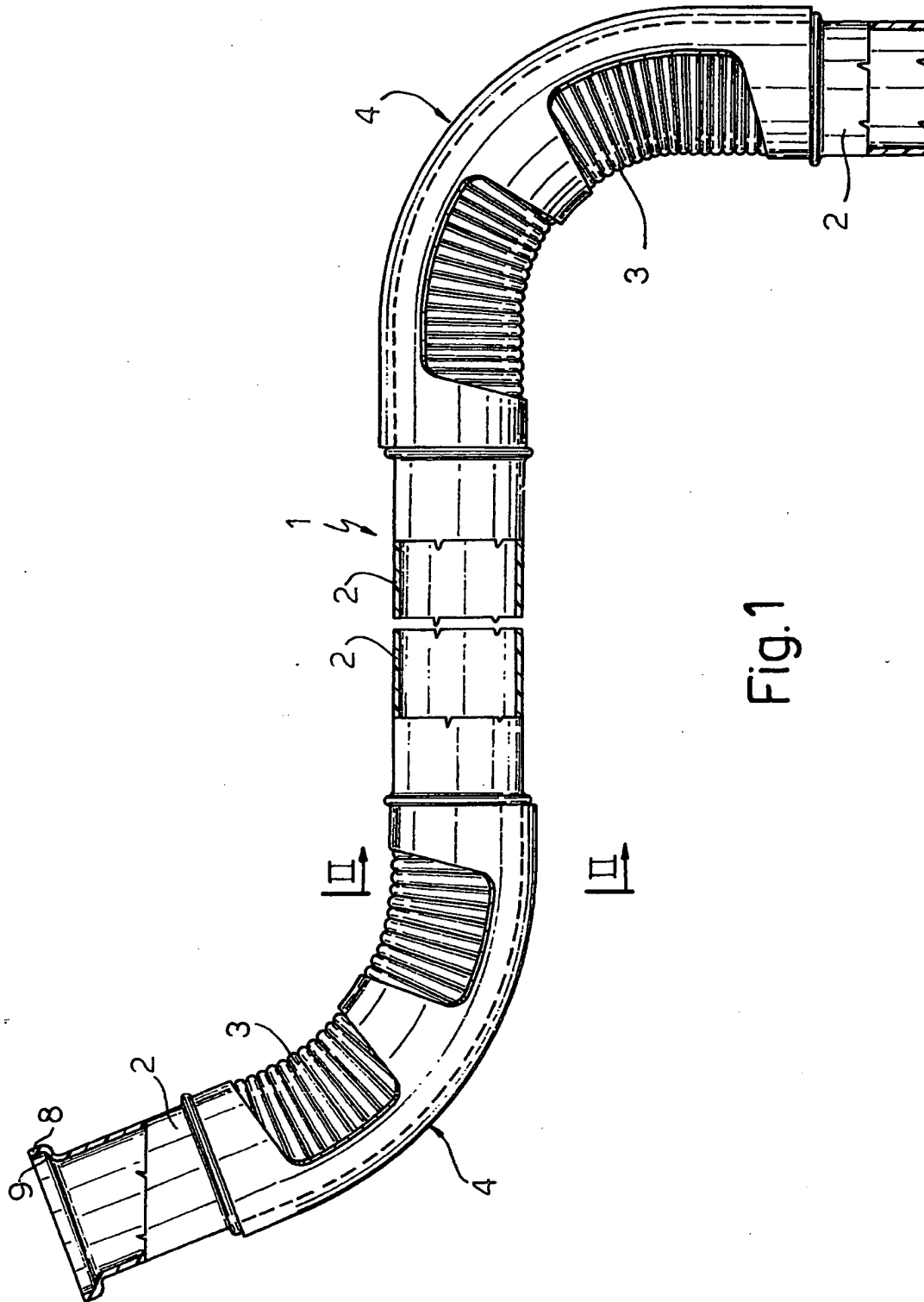


Fig. 1

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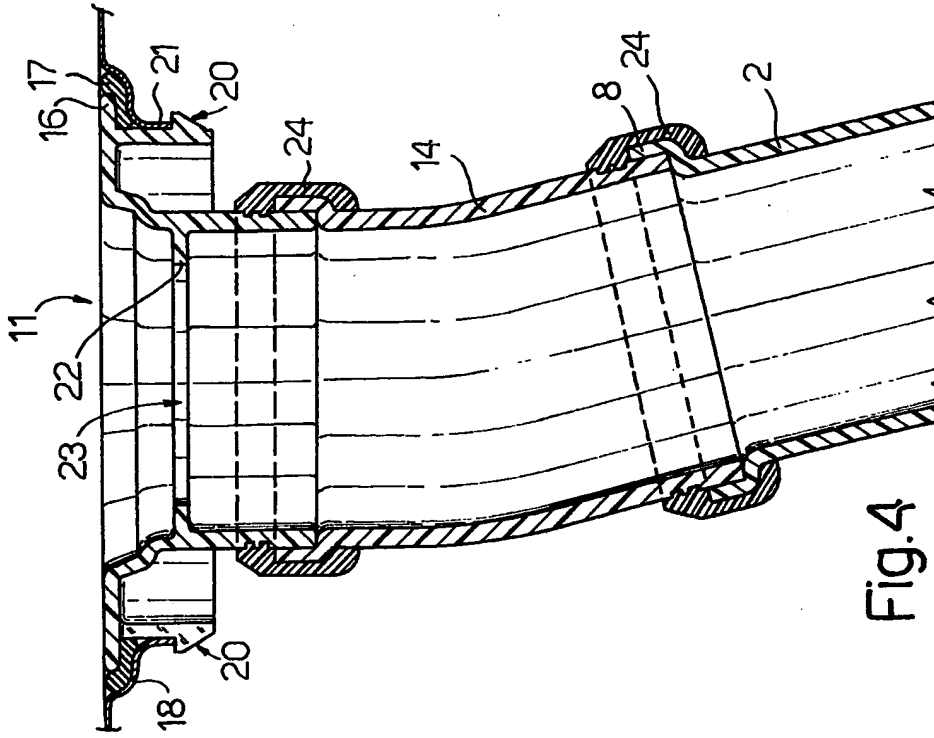


Fig. 4

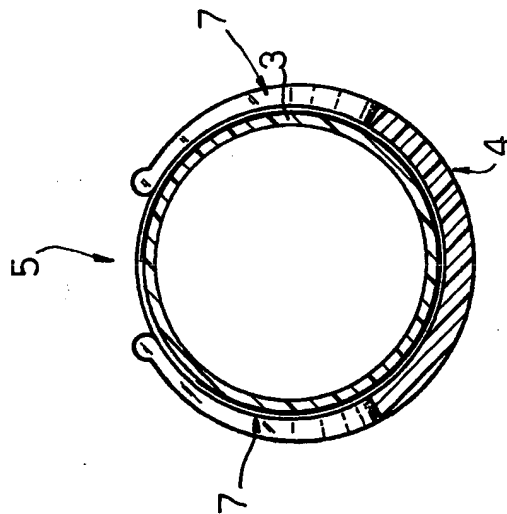
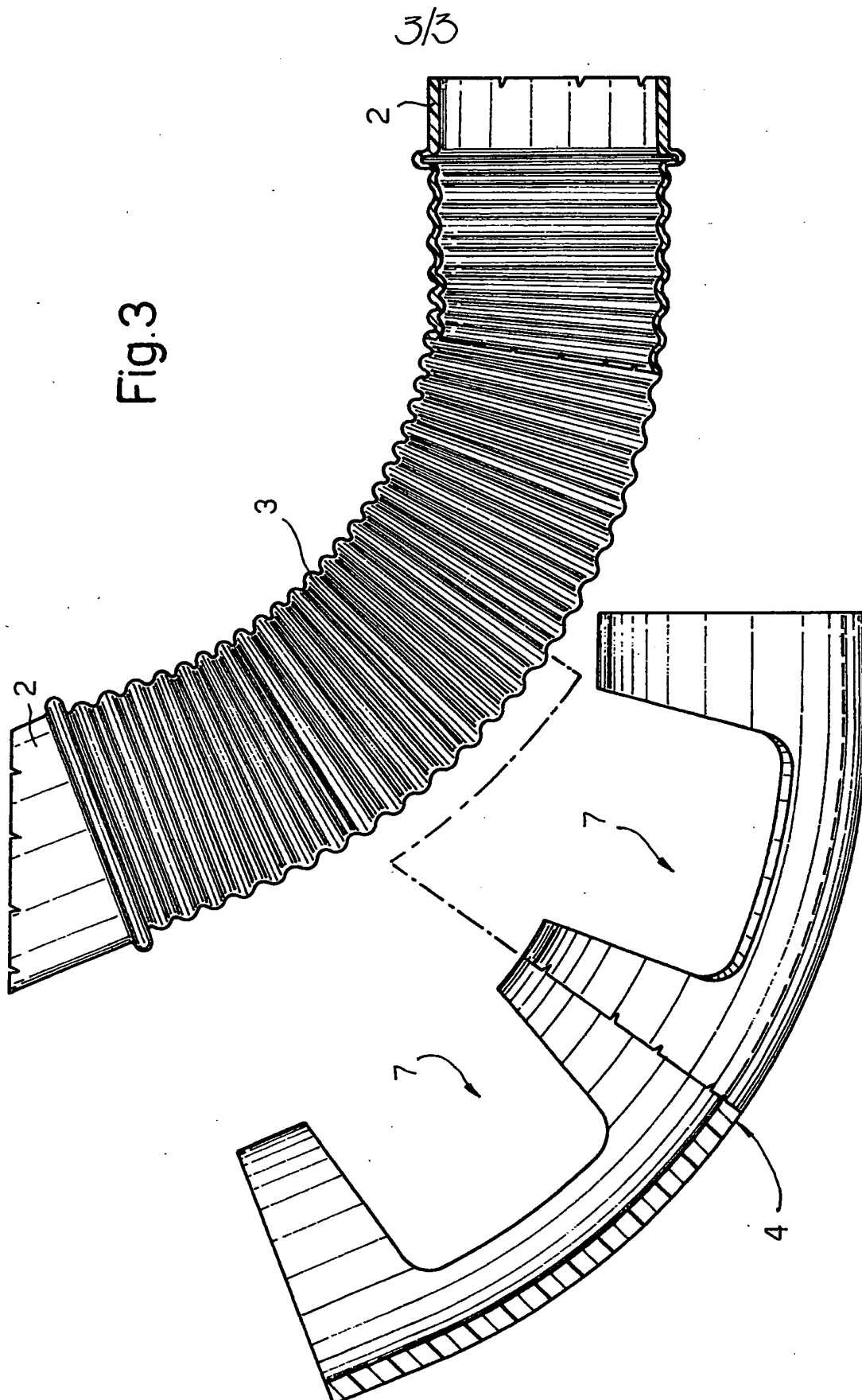


Fig. 2



SPECIFICATION

Flexible pipe

5 The present invention relates to a flexible pipe whose axis is positionable conforming to at least a section of a curved line, particularly suitable for being used as a shaped connection pipe for connecting a fuel inlet nipple to a tank disposed below the
10 body of a motor vehicle.

It is well-known that when having to arrange a pipe, configured conforming to a non-rectilinear axis, in a respective position or housing, considerable assembly problems may arise, especially when
15 the curved sections are numerous and when fixed passage spaces are present, as is the case, for example, of the application mentioned hereinabove; in fact, in this application, the shaped pipe, which is made of a metal material, bent conforming to the
20 desired shape, generally is necessarily mounted prior to carrying out the assembly of the various elements below the body of the vehicle, such as wheels, exhaust pipe, etc., with the resultant troubles during assembly and a considerable complication in case of substitution.

It is an object of the present invention to provide a flexible pipe which will be free from the disadvantages mentioned hereinabove, i.e. will be apt to be assembled and disassembled in a simple way and
30 rapidly, without any rigidity bond deriving from its configuration, and manufactured in a relatively simple and economical way.

According to the present invention there is provided a flexible pipe whose axis is positionable
35 conforming to at least a section of a curved line, characterized in that it comprises at least a portion made of a relatively deformable material, and means applicable in the said portion in order to constrain it conforming to the said section of a curved line.

40 For a better understanding of the present invention, an embodiment thereof will now be described in detail by way of a non limiting example, with reference to the accompanying drawings, in which:

Figure 1 is a partially sectional side elevational
45 view showing a section of a flexible pipe constructed according to the teachings of the present invention;
Figure 2 is a sectional view along line II-II of *Figure 1*;

Figure 3 is a side elevational view, partly sectional
50 and exploded, showing a portion of the pipe of *Figure 1*; and

Figure 4 is a sectional side elevational view showing an end of the pipe of *Figure 1*, in a particular application.

55 Referring now to *Figures 1* and *2*, the flexible pipe according to the present invention, indicated by reference numeral 1, is made of a relatively flexible material, conveniently plastics, for example high density polyethylene. The pipe comprises cylindrical
60 sections 2, arranged between bellows-shaped sections 3 in which the wall of the pipe 1 is corrugated in a plurality of corrugations and grooves. The wall of the pipe is continuous, without gaps, and forms, sequentially, the cylindrical sections 2 and the
65 bellows-shaped sections 3. Mounted on these bel-

lows-shaped sections 3 is a sleeve 4 having a curvature equal to the curvature to be conferred to the sections 3 and provided with a side slot 5 which defines for the sleeve 4 a C-shaped section (*Figure 2*) and allows the sleeve to deform and expand its sides for being mounted, substantially in a snapped fashion, onto the bellows-shaped section 3. Sleeve 4 is provided also with lightening side windows 7, and is made of a sufficiently rigid material, conveniently
75 plastics, such as to keep a prestablished shape.

Whilst one end of the pipe 1 of *Figure 1* is not shown and may have any convenient configuration for a respective coupling, the other end has a rim of larger diameter 8 with an inner annular seating 9.

80 Thus, pipe 1 is made of plastics, conveniently by blow moulding, in such a way as to have a rectilinear configuration, which ensures a greater manufacturing easiness and economicity. Furthermore, onto the bellows-shaped sections 3 there may be mounted,
85 by slipping them on sideways (*Figure 3*), the sleeves 4 which have a curvature equal to the curvature which has to be conferred to the said sections 3, so that the flexible pipe 1 becomes the desired shape configuration and therefore may be mounted in the required position, and connected at the ends, in a relatively easy manner, inasmuch as the cylindrical sections 2 also are relatively deformable. Alternatively, in case of considerable positioning difficulties, the flexible pipe 1, without the sleeves 4, may be
90 positioned with the required configuration by conveniently deforming its various sections 2 and 3, and at the end, after having achieved the desired position, the sleeves 4 may be mounted on the pipe in order to maintain in a stable manner the said position.

100 As shown in *Figure 4*, the pipe 1 is suitable for being applied onto an inlet nipple 11 for introducing fuel into a tank (not shown and connected to the other end of the pipe 1) of a motor vehicle; in particular, the pipe 1 may be applied to any inlet
105 nipple for introducing fuel for an internal combustion engine into a respective tank.

In fact, within the end rim 8 of the pipe 1 there is inserted and connected a pipe section 14, made conveniently of a relatively rigid plastic material, into
110 the outer front rim of which there is inserted and connected the end of the nipple 11 having at its front portion an annular rima 16 which rests, at its lower part, on an annular sealing gasket 17 disposed in a space formed by a depressed annular portion 18 of the body of a motor vehicle, to accommodate the nipple 11 therein. Originating from the inner side of the annular rima 16 are toothed sectors 20 which are apt to snappingly engage onto a bent inner rim 21 of the annular portion 18. Thus, the nipple 11 has a
115 inner plane 22, with a suitably shaped opening 23, for accommodating and fastening therein a plug (of known type and not shown) for the said nipple 11.

The sealing connection between the nipple 11 and the section 14 and between the section 14 and the pipe 1 is obtained conveniently by means of outer annular sealing fastener members 24, disposed
120 around the rims of larger diameter and around the contiguous sections inserted into the latter, and conveniently manufactured by moulding them directly on the said contiguous sections.
130

The nipple 11 may therefore be inserted from the outside of the body of the vehicle, by snappingly hooking the sectors 20 onto the inner rim 21, and thus be connected to the section 14 or to the pipe 1.

5 From the foregoing are evident the advantages of easy assembly and economical production obtained by the flexible pipe according to the present invention, as well as the advantage of ensuring a perfect seal, since the pipe 1 is reinforced by means of the sleeves 4 just in the region of the sections 3, having a minor relative resistance.

Finally, it is obvious that modifications and variations may be made to the embodiment described hereinabove and shown in the drawing, without departing from the scope of the present invention.

For example, the nipple 11 may comprise, made integrally therewith, also the section 14 (Figure 4), or the connection between the nipple 11 and the section 14 and between the said section 14 and the pipe 1 may be obtained in a different way, for example by glueing etc. Also, the sleeves 4 may be different in shape; moreover, the whole pipe 1 may be made with the said bellows-shaped sections, which are then be stiffened, by means of the sleeves 25 4, in convenient regions.

In the particular application as a pipe for feeding the fuel into a tank disposed below the body of motor vehicle, the said tank may be positioned in the most convenient point, there being non difficulty for giving the connection pipe a particular configuration and even a relative long length.

CLAIMS

35 1. A flexible pipe (1) whose axis is positionable conforming to at least a section of a curved line, characterized in that it comprises at least a portion (3) made of a relatively deformable material, and means (4) apt to be arranged in the said portion (3) in order to constrain it conforming to the said section of a curved line.

2. A pipe as claimed in Claim 1, characterized in that the said portion (3) is made like a bellows.

3. A pipe as claimed in Claim 1 or 2, characterized in that the said means (4) are made of a relatively more rigid material than the said portion (3) and apt to keep a pre-established shape.

4. A pipe as claimed in any of the preceding Claims, characterized in that the said means (4) are configured like sleeves and are apt to be applied on the said portion (3).

5. A pipe as claimed in Claim 4, characterized in that the said sleeves (4) are provided with a side opening (5) for the assembly on the said portion (3).

65 6. A pipe as claimed in any of the preceding Claims, characterized in that the said portion (3) is made integral with the said pipe.

7. A pipe as claimed in any of the preceding Claims, characterized in being made of a relatively flexible plastic material.

8. A pipe as claimed in any of the preceding Claims, characterized in comprising relatively more rigid sections (2) disposed at the sides of the said portion (3).

9. A pipe as claimed in any of the preceding

Claims, characterized in comprising an end section (14,11) of connection to a mouthpiece for the said pipe, the said end portion (14,11) being made of plastics relatively more rigid than that of the said pipe (1) and being connected in a sealing fashion to the said pipe.

70 10. A pipe as claimed in Claim 9, characterized in that the said end section (14,11) is provided with snappingly hooking means (20) for connection to the said mouthpiece.

11. A pipe as claimed in any of the preceding Claims, characterized in that it is disposed between a nipple (11) for the introduction of fuel for an internal combustion engine and a tank for the said fuel.

80 12. A pipe as claimed in Claim 11, characterized in that it is mounted below the body of a motor vehicle.

13. A flexible pipe, substantially as described hereinabove with reference to the annexed drawings.

Printed for Her Majesty's Stationery Office, by Croydon Printing Company Limited, Croydon, Surrey, 1982.
Published by The Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.